

N92-15098

**CFD ACTIVITY AT AEROJET
RELATED TO SEALS AND FLUID FILM BEARING**

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This presentation package covers the CFD activity at Aerojet related to seals and fluid film bearing. The presentation addresses the following topics:

1. Aerovisc Numeric and Capabilities
2. Recent Seal Application
3. Future Code Development

PRESENTATION PREVIEW

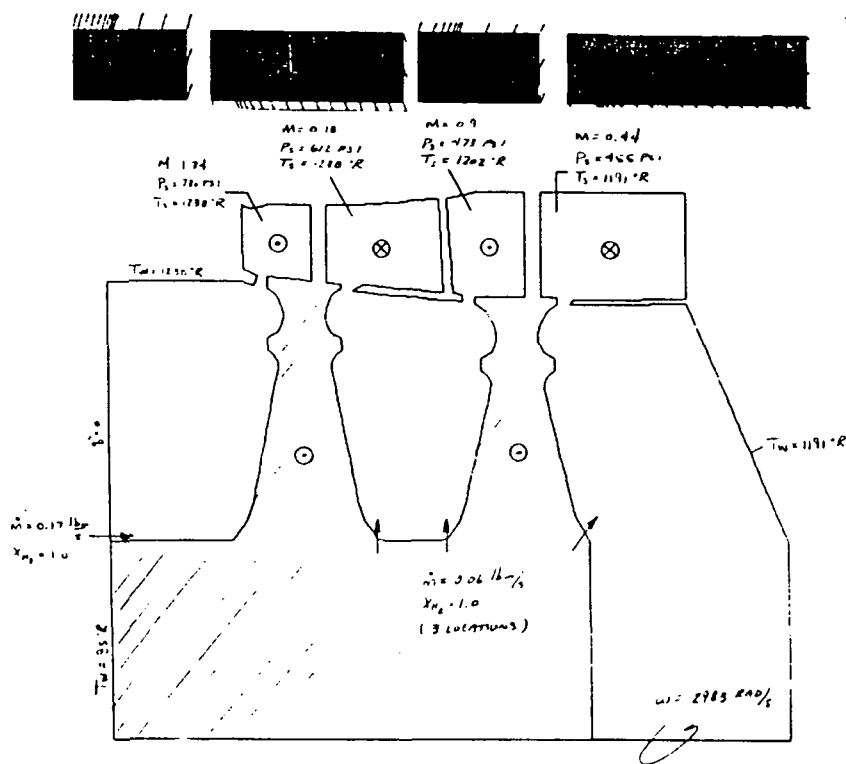
- AEROVISC NUMERICS AND CAPABILITIES
- RECENT SEAL APPLICATION
- FUTURE CODE DEVELOPMENT

AEROVISC Numerics

- **Formulation**
 - ~ Reynolds Stress Averaged Navier-Stokes Equations in Cartesian, Strongly Conservative, Primitive Variable Form
 - ~ k-e and ARS Turbulence Models With Log-Law Wall Functions
- **Discretization**
 - ~ "Flux" Element Based Finite Volume Method
 - ~ General Non-Orthogonal Boundary-Fitted Structured Grid
 - ~ Choice of Advection Schemes
 - Upward Difference (Most Robust, Least Accurate)
 - Mass Weighted Skew (Enhanced Accuracy)
 - Linear Profile Skew (Most Accurate)
 - ~ Second-Order-Accuracy With Physical Advection Correction Term
 - ~ Rhie-Type Pressure Redistribution for Incompressible Flows
- **Algebraic Solver**
 - ~ Choice of Vectorized Gauss-Siedel or Incomplete Cholesky Base Solver
 - ~ Additive Correction Multigrid (Large Grids)
 - ~ Block Correction (High Aspect Ratio Grids)

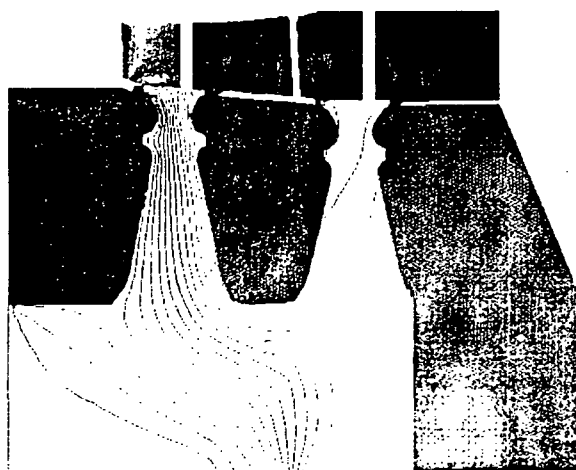
RELEVANT CODE CAPABILITIES

- INCOMPRESSIBLE FLOW
- SUBSONIC, TRANSONIC, AND SUPERSONIC FLOW
- NON-ISOTHERMAL AND ISOTHERMAL FLOW
- LAMINAR, TURBULENT, OR INVISCID FLOW
- CORIOLIS AND CENTRIFUGAL TERMS FOR TURBOMACHINERY APPLICATIONS
- FIXED, MOVING OR ROTATING TURBULENT WALLS
- CONJUGATE HEAT TRANSFER OR SPECIFIED WALL TEMPERATURE/FLUX
- VARIABLE FLUID AND SOLID PROPERTIES
- MULTI-COMPONENT FLOW (N ADDITIONAL SCALAR TRANSPORT EQUATIONS)
- MULTIPLE BLOCKED REGIONS



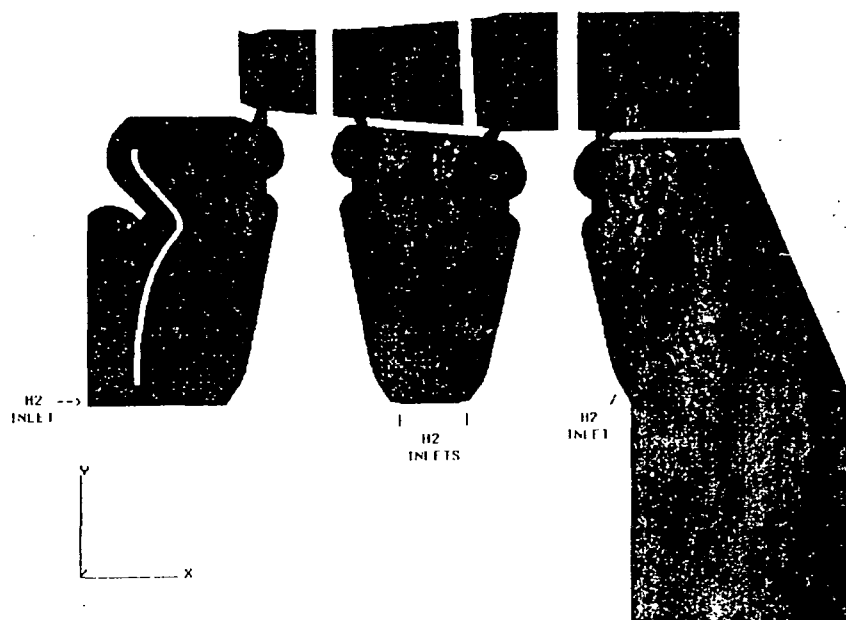
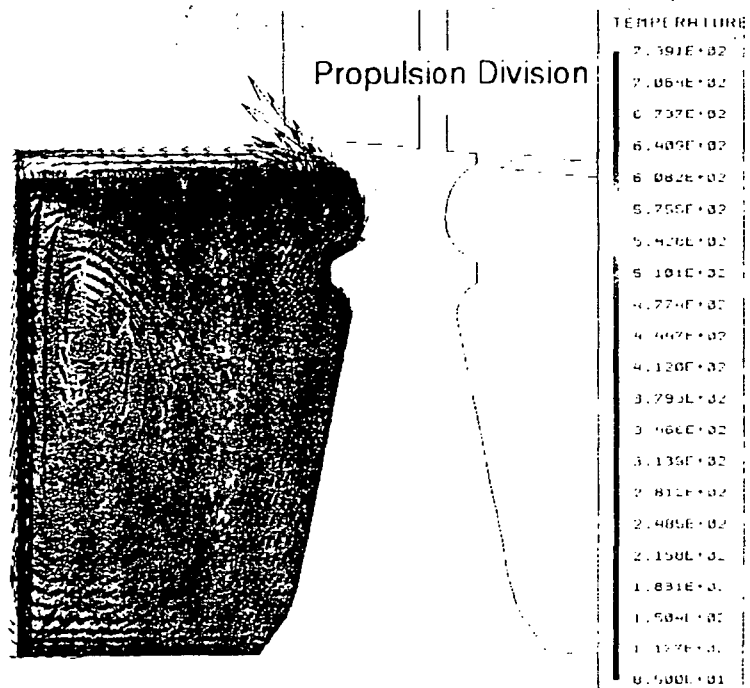
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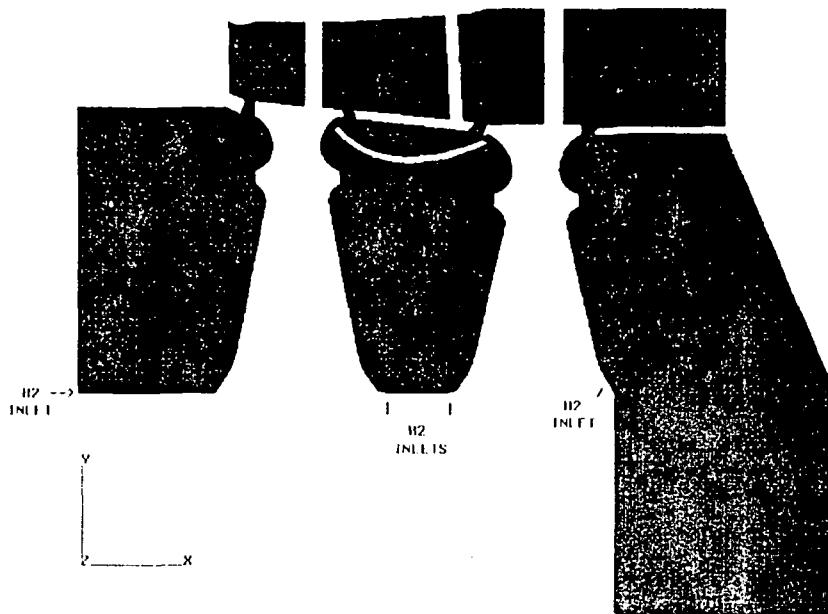
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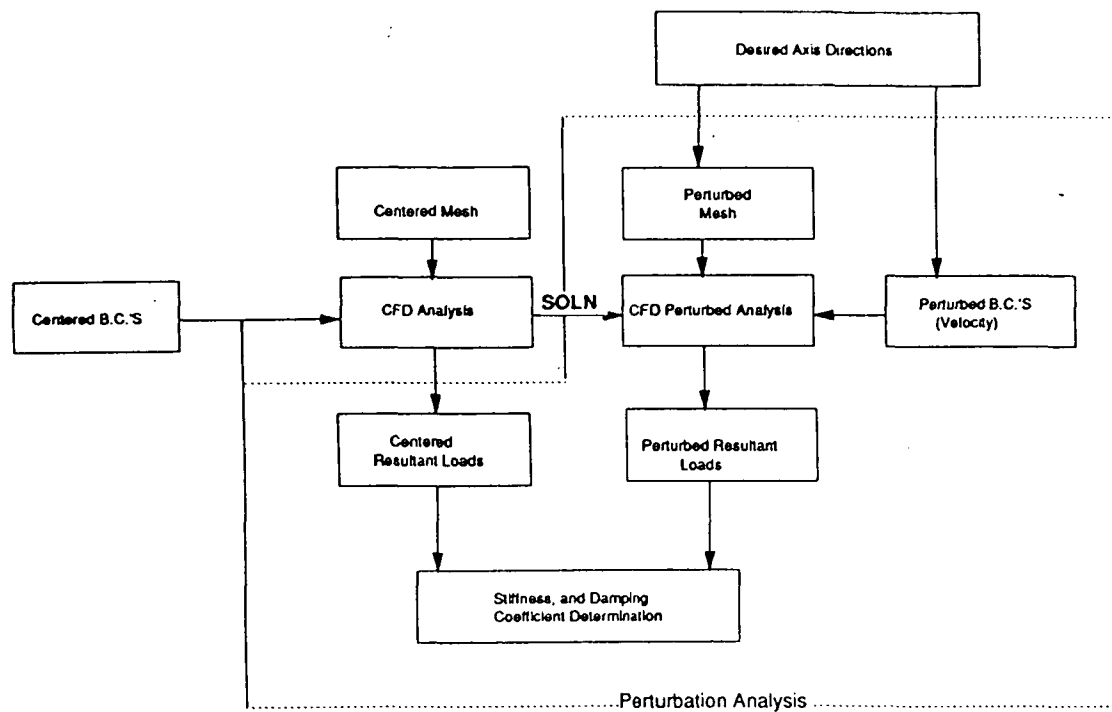
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FUTURE CODE DEVELOPMENT

- GRID EMBEDDING/ATTACHING
 - GRID REFINEMENT IN AND NEAR SEALS
 - IMPROVED SOLUTION ACCURACY
- MULTI-LAYER TURBULENCE MODEL
- AUTOMATED PROCEDURE TO PREDICT FLUID SEAL DYNAMIC COEFFICIENTS



Schematic of Fluid Film Bearing Analysis Methodology